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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,588	03/20/2006	Yuzuru Ishibashi	0152-0727PUS1	2926

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EXAMINER
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MELLON, DAVID C

ART UNIT	PAPER NUMBER
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1797

NOTIFICATION DATE	DELIVERY MODE
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05/05/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/572,588	<b>Applicant(s)</b> ISHIBASHI, YUZURU	
	<b>Examiner</b> DAVID C. MELLON	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20061019;20060320</u> .                                       | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of Group I, Claims 1-8 in the reply filed on 3/31/2009 is acknowledged. The traversal is on the ground(s) that there is no serious search burden and that method claims 9-10 are dependant upon elected independent claim 1.

This is not found persuasive because the Examiner in the restriction requirement dated 3/11/2009 established that there was a proper lack of unity. Furthermore, there would in fact be a search burden upon the examiner. Hollow fiber membranes are well known in the art to be capable of being made by numerous different types of processes. Additionally, hollow fiber membranes have been established in the art to be classified in class 210 subclass 500.23 while manners of making hollow fiber membranes have been established in the art to be classified in class 427 subclass 243. As well, merely because a claim is dependant upon a claim in a different group is not sufficient to establish that they are of the same invention. The two groups are represented by independent claims 1 and 2 and dependant claim 9. Independent claims 1 and 2 fall into the statutory category of apparatus while dependant claim 9 falls into the category of method of making. Accordingly, the shift in statutory category is clearly indicative of the presence of a second invention.

Additionally, Applicant is advised that the application was properly restricted under the rules of 371 applications and lack of unity. Accordingly, Applicant was silent as to the finding of lack of unity.

Art Unit: 1797

If applicant is attempting to state that the inventions are not patentably distinct, applicant should have submitted evidence or identify such evidence, now of record, showing the inventions to be obvious variants of each other, or clearly admit on the record that this is the case.

2. Claims 9 and 10 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 3/31/2009.

The requirement is still deemed proper and is therefore made FINAL.

### ***Specification***

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 6 and 7, the recitation of the term “current plate” renders the claim indefinite because it is unknown what precisely a “current plate” is. The

Art Unit: 1797

specification does not provide a clear definition of the term, nor is it readily apparent from the figures what precisely a current plate functions to do. Accordingly, the Examiner is interpreting "current plate" as merely a perforated plate structure. Applicant is advised that commonly in membrane arts, the term "current plate" is commonly referred to as a component of a fuel cell membrane where electrical current is harvested.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term "current plate" in claims 6 and 7 is used by the claim to mean "a perforated plate", while the accepted meaning is "an electrical current harvesting plate." The term is indefinite because the specification does not clearly redefine the term.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Haworth et al. (USP Re. 36,125).**

Art Unit: 1797

Regarding claims 1 and 2, Haworth et al. discloses a hollow fiber bundle wound on a core for radially outward flow of a fluid (Abstract) in figure 1 comprising:

- A hollow fiber membrane bundle formed of a plurality of hollow fiber membranes (70)
- A housing (12)
- An inlet (26) and an outlet (41, 40), additionally, gas inlet (22) and gas outlet (24)

Furthermore, Haworth et al. discloses a mass transfer device including a hollow fiber bundle wound on a core for radially outward flow (Abstract) wherein the packing fraction of the hollow fibers increases radially outward (C3/L25-43). Additionally, Haworth et al. discloses using incremental packing (C3/L40-53). Furthermore, Haworth et al. discloses that the range of packing fractions be such that the inner fraction is 60-95% of that of the outer packing fraction (C3/L10-27).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 1797

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**10. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boivin et al. (US 2002/0079260) and further in view of Haworth et al. (USP Re. 36,125).**

Regarding claims 1 and 2, Boivin et al. discloses a hollow fiber membrane (abstract) in figures 1 and 5 comprising:

- A hollow fiber membrane bundle formed of a plurality of hollow fiber membranes (1)
- A housing (2)
- An inlet (6) and an outlet (12 and 5)
- In figure 5 a membrane occupancy ratio wherein the region nearer to the inlet ports is disclosed as denser and the region away from the inlet ports is shown as less dense (see also [0023] for instance).

While Boivin et al. does not explicitly set forth a PB/PA ratio of 0.5-0.95, Boivin et al. does disclose decreasing hydraulic permeability as one goes inwardly from the exterior of the fiber bundle ([0023-0025]). Furthermore, the hydraulic permeability is shown as higher in areas of more dense fibers ([0021]).

Haworth et al. discloses a mass transfer device including a hollow fiber bundle wound on a core for radially outward flow (Abstract) wherein the packing fraction of the hollow fibers increases radially outward (C3/L25-43). Additionally, Haworth et al. discloses using incremental packing (C3/L40-53). Furthermore, Haworth et al.

Art Unit: 1797

discloses that the range of packing fractions be such that the inner fraction is 60-95% of that of the outer packing fraction (C3/L10-27).

Boivin et al. and Haworth et al. are combinable because they are concerned with the same field of endeavor, namely that of varied packing fraction hollow fiber membranes.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the hollow fiber membrane structure of Boivin et al. such that the outer most zone and the next zone in of the fibers has a relationship of packing densities such that the inner fraction is 60-95% of the outer fraction as taught by Haworth et al. for the purpose of reducing clogging near the core of the membrane.

Regarding claims 3-5, Boivin et al. further discloses multiple zones having differing packing densities, decreasing radially inwardly (see figures 6a-b). Boivin et al. further establishes various ratios between the greatest packing density and lowest packing density areas ([0020-0025]). Boivin et al. further discloses securing the membranes using adhesive bonding ([0026]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the packing density relationships to include consideration of 3 zones adjacent to each other such that only one is adjacent or neighboring the inlet and then two others non neighboring to the inlet and having a relationship of packing densities of 0.4-0.6 for the neighboring and 0.2-.04 for the non-neighboring as well as having a ratio such that the occupying rate is no more than 2 times the non-neighboring as a function of mere optimization. Furthermore, Boivin et al. establishes that these general



Art Unit: 1797

relationships exist in ([0020-0025]) including a relationship between the packing density of the inner most and outer most being not more than 5-10. Accordingly, one having ordinary skill in the art would have known to optimize various ratios of the relationship between zones of the hollow fiber membranes by routine experimentation to achieve desired results as it has been established that the general claim conditions are present. Furthermore, Applicant has not established a criticality of the claimed ratios with regards to specific numerical values. Additionally, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

**11. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boivin et al. (US 2002/0079260) in view of Haworth et al. (USP Re. 36,125), and further in view of Misao (JP 62204804) as cited on the IDS.**

Regarding claims 6 and 7, modified Boivin et al. discloses all of the claim limitations as set forth above. Boivin et al. is silent as to the use of a cylindrical current plate accommodating the hollow fiber membrane with a plurality of through holes without one at the nozzle.

Misao discloses in figures 1 and 2 a cylindrical current plate for a hollow fiber membrane with through holes (7) and a wall (8) at the inlet to prevent direct transfer of fluid (see English language abstract).

Boivin et al. and Misao are combinable because they are concerned with the same field of endeavor, namely that of hollow fiber membranes.

Art Unit: 1797

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the hollow fiber membrane of Boivin et al. to include a current plate such as the one disclosed by Misao for the purpose of preventing damage to the hollow fiber membrane by diverting the flow to avoid direct higher pressure impact to the yarns.

**12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boivin et al. (US 2002/0079260) in view of Haworth et al. (USP Re. 36,125), and further in view of Walker (USP 5,282,966).**

Regarding claim 8, modified Boivin et al. discloses all of the claim limitations as set forth above. While Boivin et al. discloses adhesive bonding the membranes ([0026]), Boivin et al. does not disclose explicitly using a material of high-polymer having a hardness of 50A-70D in a range of operating temperatures.

Walker discloses a membrane separation device (Abstract) which uses standard suitable potting materials (C10/L1-10) comprising of urethane resins and silicone resins (C10/L15-25) which inherently would have a shore hardness test of 50A-70D in a range of operating temperatures.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the membrane separator of Boivin et al. to use silicone or urethane potting resins as taught by Walker for the purpose of utilizing well known standard materials to provide a resilient, resistant to breaking potting seal. Furthermore, one having ordinary skill in the art would have chosen urethane or silicone resins over other polymer resins for the purpose of reducing costs and increasing chemical compatibility.

**Conclusion**

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Aune et al. (US 2003/0080051)
- Elgas et al. (USP 6,638,479)

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID C. MELLON whose telephone number is (571)270-7074. The examiner can normally be reached on Monday through Thursday 7:00am-4:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tony G Soohoo/  
Primary Examiner, Art Unit 1797

/D. C. M./  
Examiner, Art Unit 1797

Application/Control Number: 10/572,588  
Art Unit: 1797

Page 11